CLAIMS

1. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft, and the tip assembly including a wire formed of a superelastic material and shaped to bias the tip assembly in a first orientation; and

a cable, attached to the actuator and the tip assembly, that extends through the shaft, the cable being adapted to change an orientation of the tip assembly from the first orientation in response to movement of the actuator.

2. The electrophysiology catheter of claim 1, wherein:

the wire is shaped to bias the distal end of the tip assembly in a first orientation including an arcuately curved shape having a bias radius of curvature; and

the cable is adapted to change a radius of curvature of the distal end of the tip assembly to a radius of curvature larger than the bias radius of curvature in response to movement of the actuator.

3. The electrophysiology catheter of claim 2, wherein:

the wire has a radius of curvature smaller than or equal to a radius of curvature of the cable.

4. The electrophysiology catheter of either of claims 2 or 3, wherein the wire is shaped to bias the distal end of the tip assembly in a first orientation including an arcuately curved shape spanning at least three hundred and sixty degrees.

5. The electrophysiology catheter of claim 1, wherein:

the wire is shaped to bias the distal end of the tip assembly in a first orientation including an arcuately curved shape having a bias radius of curvature; and

the cable is adapted to change a radius of curvature of the distal end of the tip assembly to a radius of curvature smaller than the bias radius of curvature in response to movement of the actuator.

6. The electrophysiology catheter of claim 5, wherein:

the cable has a radius of curvature smaller than or equal to a radius of curvature of the wire.

7. The electrophysiology catheter of either of claims 5 or 6, wherein the distal end of the tip assembly curves at least three hundred and sixty degrees in response to movement of the actuator.

8. The electrophysiology catheter of claim 1, wherein:

the wire is shaped to bias the proximal end of the tip assembly in a first orientation including a bend having a bias angle of approximately ninety degrees relative to the longitudinal axis of the shaft; and

the cable is adapted to change an angle of the bend of the proximal end of the tip assembly to an angle smaller than the bias angle in response to movement of the actuator.

9. The electrophysiology catheter of claim 8, wherein:

the wire is disposed in an inner portion of the tip assembly and the cable is disposed in an outer portion of the tip assembly with respect to the angle of the bend of the proximal end of the tip assembly.

10. The electrophysiology catheter of claim 1, wherein:

the wire is shaped to bias the proximal end of the tip assembly in a first orientation including a bend having a bias angle relative to the longitudinal axis of the shaft; and

the cable is adapted to change an angle of the bend of the proximal end of the tip assembly to an angle of approximately ninety degrees relative to the longitudinal axis of the shaft in response to movement of the actuator.

11. The electrophysiology catheter of claim 10, wherein:

the wire is disposed in an outer portion of the tip assembly and the cable is disposed in an inner portion of the tip assembly with respect to the angle of the bend of the proximal end of the tip assembly.

12. The electrophysiology catheter of claim 1, wherein:

the wire is shaped to bias the distal end of the tip assembly in a linear orientation; and

the cable is adapted to deform the wire so that the wire forms arcuate curve at the distal end of the tip assembly in response to movement of the actuator.

13. The electrophysiology catheter of claim 1, wherein:

the wire is shaped to bias the proximal end of the tip assembly in a linear orientation; and

the cable is adapted to deform the wire so that the wire forms a bend of approximately ninety degrees with respect to the longitudinal axis of the tip assembly at the proximal end of the tip assembly in response to movement of the actuator.

14. The electrophysiology catheter of any of claims 1-13, wherein the wire is formed of a nickel titanium compound.

15. The electrophysiology catheter of claim 14, wherein the wire is formed of nitinol.

16. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle; and

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft and the tip assembly including an adhesive cured in a configuration to bias the tip assembly in a first orientation.

17. The electrophysiology catheter of claim 16, wherein the first orientation includes a bend at the proximal end of the tip assembly having an angle of approximately ninety degrees relative to the longitudinal axis of the shaft.

18. The electrophysiology catheter of either of claims 16 or 17, wherein the first orientation includes an arcuately curved shape at the distal end of the tip assembly.

19. The electrophysiology catheter of claim 16, further comprising:

a first cable, attached to the actuator and the tip assembly, that extends through the shaft, the first cable being adapted to change an orientation of the tip assembly from the first orientation in response to movement of the actuator.

20. The electrophysiology catheter of claim 19, wherein:

the first orientation includes an arcuately curved shape at the distal end of the tip assembly having a bias radius of curvature; and

the first cable is adapted to change a radius of curvature of the distal end of the tip assembly to a radius of curvature larger than the bias radius of curvature in response to movement of the actuator.

21. The electrophysiology catheter of claim 20, wherein the first orientation includes an arcuately curved shape spanning at least three hundred and sixty degrees.

22. The electrophysiology catheter of claim 19, wherein:

the first orientation includes an arcuately curved shape at the distal end of the tip assembly having a bias radius of curvature; and

the first cable is adapted to change a radius of curvature of the distal end of the tip assembly to a radius of curvature smaller than the bias radius of curvature in response to movement of the actuator.

23. The electrophysiology catheter of claim 22, wherein the distal end of the tip assembly curves at least three hundred and sixty degrees in response to movement of the actuator.

24. The electrophysiology catheter of claim 20, wherein:

a second cable is adapted to change a radius of curvature of the distal end of the tip assembly to a radius of curvature smaller than the bias radius of curvature in response to movement of the actuator.

25. The electrophysiology catheter of claim 16, wherein:

the first orientation includes a bend at the proximal end of the tip assembly having a bias angle of approximately ninety degrees relative to the longitudinal axis of the shaft; and

the first cable is adapted to change an angle of the bend of the proximal end of the tip assembly to an angle smaller than the bias angle in response to movement of the actuator.

26. The electrophysiology catheter of claim 25, wherein:

the adhesive is disposed in an inner portion of the tip assembly and the first cable is disposed in an outer portion of the tip assembly with respect to the angle of the bend of the proximal end of the tip assembly.

27. The electrophysiology catheter of claim 25, further including a second cable adapted to change an angle of the bend of the proximal end of the tip assembly to an angle of approximately ninety degrees relative to the longitudinal axis of the shaft in response to movement of the actuator.

28. The electrophysiology catheter of claim 16, wherein:

the first orientation includes a bend having a bias angle relative to the longitudinal axis of the shaft; and

the first cable is adapted to change an angle of the bend of the proximal end of the tip assembly to an angle of approximately ninety degrees relative to the longitudinal axis of the shaft in response to movement of the actuator.

29. The electrophysiology catheter of claim 28, wherein:

the adhesive is disposed in an outer portion of the tip assembly and the first cable is disposed in an inner portion of the tip assembly with respect to the angle of the bend of the proximal end of the tip assembly.

30. The electrophysiology catheter of claim 16, wherein:

the first orientation includes a linear orientation along the longitudinal axis of the shaft at the distal end of the tip assembly; and

the first cable is adapted to form an arcuate curve at the distal end of the tip assembly in response to movement of the actuator.

31. The electrophysiology catheter of claim 16, wherein:

the first orientation includes a linear orientation along the longitudinal axis of the shaft at the proximal end of the tip assembly; and

the first cable is adapted to form a bend of approximately ninety degrees with respect to the longitudinal axis of the tip assembly at the proximal end of the tip assembly in response to movement of the actuator.

32. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft and the tip assembly including an adhesive cured in a configuration to support the tip assembly in a first orientation including an arcuately curved shape at the distal end of the tip assembly having a first radius of curvature;

a first cable, attached to the actuator and the tip assembly, that extends through the shaft, the first cable being adapted to change an orientation of the tip assembly from the first orientation to a second orientation including an arcuately curved shape at the distal end of the

tip assembly having a second radius of curvature larger than the first radius of curvature in response to movement of the actuator; and

a second cable, attached to the actuator and the tip assembly, that extends through the shaft, the second cable being adapted to change the orientation of the tip assembly from the second orientation to the first orientation in response to movement of the actuator.

33. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft and the tip assembly including an adhesive cured in a configuration to support the tip assembly in a first orientation including a bend at the proximal end of the tip assembly having a first angle of approximately ninety degrees relative to the longitudinal axis of the shaft;

a first cable, attached to the actuator and the tip assembly, that extends through the shaft, the first cable being adapted to change an orientation of the tip assembly from the first orientation to a second orientation including a bend at the proximal end of the tip assembly having a second angle relative to the longitudinal axis that is smaller than the first angle in response to movement of the actuator; and

a second cable, attached to the actuator and the tip assembly, that extends through the shaft, the second cable being adapted to change the orientation of the tip assembly from the second orientation to the first orientation in response to movement of the actuator.

34. The electrophysiology catheter of claim 33, wherein the first angle is approximately ninety degrees.

35. The electrophysiology catheter of any of claims 16-34, wherein the adhesive is epoxy.

36. The electrophysiology catheter of any of claims 16-34, wherein the adhesive is silicone.

37. A method of shaping a tip assembly of a catheter, comprising acts of:

injecting an adhesive into a lumen of the catheter that extends along the tip assembly of the catheter; and

curing the adhesive by maintaining a portion of the tip assembly of the catheter in a fixed position for a time sufficient to allow the adhesive to bias the tip assembly in a particular orientation.

38. The method of claim 37, wherein the act of curing the adhesive includes maintaining a proximal end of the tip assembly in a bent shape having an angle of approximately ninety degrees.

39. The method of either of claims 37 or 38, wherein the act of curing the adhesive includes maintaining a distal end of the tip assembly in an arcuately curved shape.

40. The method of claim 37, wherein the act of curing the adhesive includes maintaining a portion of the tip assembly in a linear shape.

41. The method of any of claims 37-40, wherein the act of injecting the adhesive includes injecting epoxy into the lumen of the catheter.

42. The method of any of claims 37-40, wherein the act of injecting the adhesive includes injecting silicone into the lumen of the catheter.

43. The method of any of claims 37-40, wherein the act of curing the adhesive includes heating the tip assembly of the catheter at a predetermined temperature.

44. A method of using a catheter having a handle, a flexible shaft having a longitudinal axis, and a tip assembly, the shaft being connected between the handle and the

tip assembly, a distal end of the tip assembly including an arcuate curve having a diameter, the method comprising acts of:

placing the tip assembly inside a heart of a patient;

injecting a fluid from the tip assembly into the heart of the patient; and

remotely, from outside the patient, adjusting the diameter of the arcuate curve.

45. The method of claim 44, wherein the act of injecting the fluid includes injecting a contrast agent from the tip assembly into the heart of the patient.

46. The method of claim 45, wherein the act of injecting the fluid includes injecting a radio-opaque dye from the tip assembly into the heart of the patient.

47. The method of claim 44, wherein the act of injecting the fluid includes injecting a drug from the tip assembly into the heart of the patient.

48. The method of claim 47, wherein the act of injecting the fluid includes injecting an antithrombogenic agent from the tip assembly into the heart of the patient.

49. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft and the distal end of the tip assembly being biased in an arcuately curved shape having a radius of curvature;

a cable, attached to the actuator and the distal end of the tip assembly, that extends through the shaft, the cable being adapted to change the radius of curvature of the distal end of the tip assembly in response to movement of the actuator; and

means for conducting a fluid along a length of the shaft and releasing the fluid from the tip assembly.

50. The electrophysiology catheter of claim 49, wherein the proximal end of the tip assembly includes a fixed bend of approximately ninety degrees relative to the longitudinal axis of the shaft, and wherein the arcuately curved shape of the distal end of the tip assembly is oriented in a plane that is approximately perpendicular to the longitudinal axis of the shaft.

51. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft and the distal end of the tip assembly being biased in an arcuately curved shape having a radius of curvature;

a cable, attached to the actuator and the distal end of the tip assembly, that extends through the shaft, the cable being adapted to change the radius of curvature of the distal end of the tip assembly in response to movement of the actuator;

at least one lumen coupled to the shaft to conduct a fluid along a length of the shaft; and

at least one opening in the lumen to release the fluid, the opening being disposed at a portion of the lumen coupled to the shaft at the tip assembly.

52. The electrophysiology catheter of claim 51, wherein the proximal end of the tip assembly includes a fixed bend of approximately ninety degrees relative to the longitudinal axis of the shaft, and wherein the arcuately curved shape of the distal end of the tip assembly is oriented in a plane that is approximately perpendicular to the longitudinal axis of the shaft.

53. The electrophysiology catheter of either of claims 51 or 52, wherein the lumen is disposed within the shaft of the catheter and the at least one opening in the lumen is coupled to at least one opening in the tip assembly of the catheter.

54. The electrophysiology catheter of any of claims 51-53, wherein the at least one lumen includes a lumen disposed along the longitudinal axis of the shaft.

55. The electrophysiology catheter of any of claims 51-53, wherein the at least one lumen includes a lumen disposed along an axis that is offset from the longitudinal axis of the shaft.

56. The electrophysiology catheter of any of claims 51-53, wherein the lumen is disposed exterior to the shaft of the catheter.

57. The electrophysiology catheter of any of claims 51-56, wherein the at least one opening is disposed at a portion of the lumen coupled to the shaft at a portion of the tip assembly proximal to the fixed bend.

58. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft and the distal end of the tip assembly being biased in an arcuately curved shape having a radius of curvature; and

a cable, attached to the actuator and the distal end of the tip assembly, that extends through the shaft, the cable being adapted to change the radius of curvature of the distal end of the tip assembly in response to movement of the actuator;

wherein the distal end of the tip assembly includes a plurality of position sensors disposed in the distal end of the tip assembly.

59. The electrophysiology catheter of claim 58, further comprising first and second mapping electrodes, and wherein a first position sensor is disposed in or adjacent the first mapping electrode and a second position sensor is disposed in or adjacent the second mapping electrode.

60. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft, the proximal end of the tip assembly including a fixed bend of approximately ninety degrees relative to the longitudinal axis of the shaft, and the distal end of the tip assembly including an arcuate curve having a diameter, the arcuate curve being oriented in a plane that is approximately perpendicular to the longitudinal axis of the shaft; and

a cable, attached to the actuator and the distal end of the tip assembly, that extends through the shaft, the cable being adapted to change the diameter of the arcuate curve in response to movement of the actuator;

wherein the distal end of the tip assembly includes a plurality of position sensors disposed in the distal end of the tip assembly.

61. The catheter of claim 60, further comprising first and second mapping electrodes, and wherein a first position sensor is disposed in or adjacent the first mapping electrode and a second position sensor is disposed in or adjacent the second mapping electrode.

62. The catheter of claim 61, further comprising a third mapping electrode, and wherein a third position sensor is disposed in or adjacent the third mapping electrode.

63. A method of using a catheter having a handle, a flexible shaft having a longitudinal axis, and a tip assembly, the shaft being connected between the handle and the tip assembly, a distal end of the tip assembly including an arcuate curve having a diameter, the method comprising acts of:

placing the tip assembly inside a heart of a patient;

sensing the location of at least one two points on the tip assembly; and

remotely, from outside the patient, adjusting the diameter of the arcuate curve.

64. The method of claim 63, wherein the act of sensing includes sensing the location of first and second electrodes disposed on the tip assembly.

65. The method of claim 64, wherein the act of sensing includes sensing the location of a third electrode disposed on the tip assembly.

66. The method of claim 63, further including an act of injecting a contrast agent from the tip assembly into the heart of the patient.

67. The method of claim 63, further including an act of injecting a drug from the tip assembly into the heart of the patient.

68. A method of using a catheter having a handle, a flexible shaft having a longitudinal axis, and a tip assembly, the shaft being connected between the handle and the tip assembly, a distal end of the tip assembly including an arcuate curve having a diameter, the method comprising acts of:

placing the tip assembly inside a heart of a patient;

sensing the location of a movable electrode disposed on the tip assembly; and

remotely, from outside the patient, adjusting the diameter of the arcuate curve.

69. The method of claim 68, further including an act of injecting a contrast agent from the tip assembly into the heart of the patient.

70. The method of claim 68, further including an act of injecting a drug from the tip assembly into the heart of the patient.

71. An electrophysiology catheter comprising:

a handle having a distal end and a proximal end, the handle including a first actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft and the distal end of the tip assembly being biased in an arcuately curved shape having a radius of curvature, wherein the distal end of the tip assembly includes a movable electrode assembly comprising an electrode, a position sensor, and means for moving the electrode and position sensor longitudinally along a portion of the length of the shaft; and

a first cable, attached to the first actuator and the distal end of the tip assembly, that extends through the shaft, the cable being adapted to change the radius of curvature of the distal end of the tip assembly in response to movement of the actuator in a first direction.

72. The electrophysiology catheter of claim 71, wherein the first cable is adapted to reduce the radius of curvature of the distal end of the tip assembly in response to movement of the actuator in a first direction, wherein the handle further comprises second and third actuators, and wherein the electrophysiology catheter further comprises:

a second cable, attached to the first actuator and the distal end of the tip assembly, that extends through the shaft, the second cable being adapted to increase the radius of curvature of the distal end of the tip assembly in response to movement of the first actuator in a second direction that is opposite to the first direction;

a third cable, attached to the second actuator and the proximal end of the tip assembly, that extends through the shaft, the third cable being adapted to bend the proximal end of the tip assembly in a third direction that is perpendicular to the longitudinal axis of the shaft;

a fourth cable, attached to the second actuator and the proximal end of the tip assembly, that extends through the shaft, the fourth cable being adapted to bend the proximal end of the tip assembly in a fourth direction that is perpendicular to the longitudinal axis of the shaft; and

a fifth cable, attached to the third actuator and the movable electrode assembly, that extends through the shaft, the fifth cable being adapted to change a position of the movable electrode assembly along the arcuately curved shape of the distal end of the tip assembly.

73. The electrophysiology catheter of claim 72, wherein the handle further includes:

graphical indicia, disposed on the handle adjacent the third actuator, indicative of a position of the movable electrode assembly with respect to the shaft.

74. A flexible shaft of a catheter device, the shaft comprising:

a catheter body having a proximal end and a distal end and a longitudinal axis that extends along a length of the catheter body; and

a channel formed of a superelastic material and shaped to bias a portion of the catheter body in a first orientation.

75. The flexible shaft of claim 74, wherein a lumen is disposed within the catheter body and the channel is disposed within the lumen.

76. The flexible shaft of claim 75, wherein a second lumen is disposed within the catheter body, and wherein a second channel formed of a superelastic material is disposed within the second lumen.

77. The flexible shaft of claim 76, wherein the first and second channels are approximately the same length and occupy substantially the same longitudinal location in the catheter body.

78. The flexible shaft of claim 74, wherein:

the channel is shaped to bias the proximal end of the catheter body in a first orientation including a bend having a bias angle of approximately ninety degrees relative to the longitudinal axis of the catheter body.

79. The flexible shaft of claim 78, wherein an angle of the bend is manipulable via a control mechanism.

80. The flexible shaft of any of claims 74-79, wherein a portion of the catheter body at the bend is formed of a material having a lower durometer than material that forms adjacent portions of the catheter body.

81. The flexible shaft of any of claims 74-80, wherein the channel comprises first and second legs that are joined by an arcuate shaped portion such that an angle is formed between the first and second legs.

82. The flexible shaft of claim 81, wherein the angle between the first and second legs is acute.

83. The flexible shaft of claim 74, wherein:

the channel is shaped to bias the proximal end of the catheter body in a first orientation including an arcuately curved shape having a bias radius of curvature.

84. The flexible shaft of claim 78, wherein a radius of curvature of the arcuately curved shape is manipulable via a control mechanism.

85. The flexible shaft of any of claims 74-84, wherein the channel is formed of a nickel titanium compound.

86. The flexible shaft of claim 85, wherein the channel is formed of nitinol.

87. The flexible shaft of any of claims 74-84, wherein the channel is formed of spring-tempered stainless steel.

88. The flexible shaft of any of claims 74-87, wherein the channel is a cylindrical tube.

89. The flexible shaft of claim 88, wherein the channel has an inner surface diameter of approximately 0.01-0.011 inch.

90. The flexible shaft of claim 89, wherein the channel has an outer surface diameter of approximately 0.014-0.015 inch.

91. The flexible shaft of any of claims 74-90, wherein an interior surface of the channel is coated with a low-friction material.

92. The flexible shaft of any of claims 74-91, wherein the cable is formed of a low-friction material.

93. The flexible shaft of any of claims 74-91, wherein the cable is formed of a low-friction material.

94. The flexible shaft of any of claims 91-93, wherein the low-friction material is teflon.

95. An electrophysiology catheter, comprising:

a handle having a distal end and a proximal end, the handle including an actuator;

a flexible shaft having a proximal end and a distal end and a longitudinal axis that extends along a length of the shaft, the proximal end of the shaft being attached to the distal end of the handle;

a tip assembly having a proximal end and a distal end, the proximal end of the tip assembly being attached to the distal end of the shaft, and the tip assembly including a channel formed of a superelastic material and shaped to bias the tip assembly in a first orientation; and

a cable, attached to the actuator and the tip assembly and extending through the channel, the cable being adapted to change an orientation of the tip assembly from the first orientation in response to movement of the actuator.

96. The electrophysiology catheter of claim 95, wherein:

the channel is shaped to bias the proximal end of the tip assembly in a first orientation including a bend having a bias angle of approximately ninety degrees relative to the longitudinal axis of the shaft.

97. The electrophysiology catheter of claim 96, wherein an angle of the bend is manipulable using a second cable attached to the actuator and the tip assembly.

98. The electrophysiology catheter of claim 97, wherein:

the superelastic channel is disposed in an inner portion of the tip assembly and the second cable is disposed in an outer portion of the tip assembly with respect to the angle of the bend of the proximal end of the tip assembly.

99. The electrophysiology catheter of claim 95, wherein:

the channel is shaped to bias the proximal end of the tip assembly in a first orientation including an arcuately curved shape having a bias radius of curvature.

100. The electrophysiology catheter of claim 99, wherein a radius of curvature of the arcuately curved shape is manipulable using a second cable attached to the actuator and the tip assembly.

101. The electrophysiology catheter of claim 100, wherein:

the superelastic channel is disposed in an inner portion of the tip assembly and the second cable is disposed in an outer portion of the tip assembly with respect to the arcuately curved shape.